CLAIMS

What is claimed is:

1. A method of using an optical circuit to transfer information of an information-bearing signal from a first wavelength to a second wavelength, the optical circuit having an input port, an output port, and a polarization controller in communication with a laser diode, the method comprising:

(a) inputting into the input port an information-bearing signal having the first wavelength, the polarization controller receiving the information-bearing signal;

(b) the polarization controller adjusting the polarization of the information-bearing signal;

(c) the laser diode (i) receiving the polarization-adjusted information-bearing signal from the polarization controller, and (ii) generating a converted information-bearing signal by transferring the information of the polarization-adjusted information-bearing signal from the first wavelength to the second wavelength; and

(d) outputting from the output port the converted information-bearing signal.

2. The method of claim 1 further comprising:

(e) amplifying the information-bearing signal having the first wavelength.

3. The method of claim 1 further comprising:

(e) amplifying the converted information-bearing signal.

4. The method of claim 1 further comprising:

(e) amplifying the information-bearing signal having the first wavelength; and

(f) amplifying the converted information-bearing signal.

5. The method of claim 1 further comprising:

(e) filtering the converted information-bearing signal to suppress or eliminate the first wavelength.

6. The method of claim 1 further comprising:

(e) adjusting the polarization of the converted information-bearing signal.

7. An all-optical wavelength converter circuit for transferring information of an information-bearing signal from a first wavelength to a second wavelength, the wavelength converter circuit comprising:

(a) a polarization controller for (i) receiving an information-bearing signal having the first wavelength, and (ii) adjusting the polarization of the information-bearing signal; and

(b) a laser diode in communication with the polarization controller, the laser diode generating a converted information-bearing signal by transferring the information of the polarization-adjusted information-bearing signal from the first wavelength to the second wavelength.

8. The all-optical wavelength converter circuit of claim 7 further comprising:

(c) at least one filter for filtering the converted information-bearing signal to suppress or eliminate the first wavelength; and

(d) a routing device in communication with the polarization controller and the filter, the routing device (i) directing the information-bearing signal having the first wavelength to the polarization controller, and (ii) directing the converted information-bearing signal to the filter.

9. The all-optical wavelength converter circuit of claim 8 further comprising:

(e) an amplifier in communication with the routing device for amplifying the information-bearing signal having a first wavelength.

10. The all-optical wavelength converter circuit of claim 8 further comprising:

(e) an amplifier in communication with the filter for amplifying the filtered converted information-bearing signal.

11. The all-optical wavelength converter circuit of claim 8 wherein the routing device is an optical circulator.

12. The all-optical wavelength converter circuit of claim 8 wherein the routing device is an optical directional coupler.

13. The all-optical wavelength converter circuit of claim 7 further comprising:

(c) a routing device in communication with the polarization controller, the routing device (i) directing the information-bearing signal having the first wavelength to the polarization controller, and (ii) directing the converted information-bearing signal to the filter; and

(d) an amplifier in communication with the routing device for amplifying the converted information-bearing signal.

14. The all-optical wavelength converter circuit of claim 7 wherein the laser diode is a non-isolated distributed feedback laser diode.

15. The all-optical wavelength converter circuit of claim 7 wherein the laser diode is an external cavity laser diode.

16. The all-optical wavelength converter circuit of claim 7 wherein the laser diode is a Fabry-Perot laser diode.

17. The all-optical wavelength converter circuit of claim 6 wherein the laser diode is a pulsed laser diode.

18. The all-optical wavelength converter circuit of claim 7 wherein the laser diode is a solid-state laser diode.

19. The all-optical wavelength converter circuit of claim 7 wherein the laser diode is a fiber laser diode.

20. The all-optical wavelength converter circuit of claim 7 wherein the laser diode transmits the converted information-bearing signal to the polarization controller which adjusts the polarization of the converted information-bearing signal.

21. An all-optical wavelength converter circuit for transferring information of an information-bearing signal from a first wavelength to a second wavelength, the circuit comprising:

a laser diode in communication with the information-bearing signal, the laser diode transferring the information of the information-bearing signal from the first wavelength to the second wavelength using cross-gain modulation.

22. The all-optical wavelength converter circuit of claim 21 wherein a polarization controller adjusts the polarization of the information-bearing signal having the first wavelength prior to the laser diode transferring the information to the second wavelength.

23. An optical wavelength switch comprising:

an input for receiving at least a first information-bearing signal having a first wavelength and a second information-bearing signal having a second wavelength;

at least two all-optical wavelength converter circuits, each wavelength converter circuit including a laser diode, the laser diode of one of the at least two wavelength converter circuits being in communication with one of the at least first and second information-bearing signals, the laser diode of the other of the at least two wavelength converter circuits being in communication with the other of the at least first and second information-bearing signals, wherein the laser diode in each of the wavelength converter circuits transfers information of the respective information-bearing signal to another wavelength using cross-gain modulation; and

an output for transmitting the at least first and second information-bearing signals, wherein the first information-bearing signal has the second wavelength and the second information-bearing signal has the first wavelength.

24. The optical wavelength switch of claim 23 wherein the all optical wavelength converter circuits include a polarization controller which adjusts the polarization of the information-bearing signal in communication with the laser diode prior to the laser diode transferring the information of the respective information-bearing signal to another wavelength.